Consumers Power

POWERING MICHIGAN'S PROGRESS

Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

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May 23, 1994

Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
JUSTIFICATION FOR CONTINUED OPERATION WITH NONCONFORMING EMERGENCY DIESEL GENERATOR FUEL OIL SUPPLY SYSTEM

During an evaluation of the emergency diesel generator (EDG) fuel oil supply system it was determined that portions of the system, including fuel oil storage tank T-10 and associated piping, are not tornado missile protected. We have determined that this condition does not meet the original 10CFR50, Appendix A, General Design Criteria (GDC-2). We have also determined that the diesel fuel oil storage and transfer system has not been maintained as safety related since plant construction and the diesel fuel oil transfer pumping system is not fully protected from the effects of a design basis seiche.

Interim measures have been implemented to ensure a continuous diesel fuel oil supply is available to the EDGs and to increase the reliability of the EDGs in a tornado/tornado missile event and in a flooding event resulting from a seiche. Therefore, we conclude that the current design, with the interim measures described in LER 94-007 and repeated below, is sufficient to ensure safe shutdown in any design basis event.

The nonconforming condition of the EDG fuel oil supply system was previously reported to the NRC by LER 94-007 dated April 7, 1994. The following corrective actions were identified in the LER and have been completed:

- Procedures and equipment to transfer oil from tank T-926 (additional on-site fuel oil storage) directly to the diesel generator day tanks have been provided and verified.

- Barriers around T-10 for routine protection from vehicles have been provided.

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- A barrier at the T-926 connection to T-10 has been provided.

- A memo defining the safety related aspects of the T-10 tank and the diesel fuel oil transfer system has been provided to the Nuclear Engineering and Construction Organization (NECO) and the plant staff.

The following longer term corrective actions were identified in the LER and are planned to improve the EDG fuel oil transfer system and provide a 7-day fuel oil supply fully capable of meeting the design requirements:

- Protect the fuel oil transfer pumps from potential flooding from a seiche. This is expected to be completed by June 30, 1994.

- Evaluate the system to determine the modifications required to upgrade it to a fully qualified 7-day fuel oil supply. The results of the evaluation will be provided to the NRC by August 31, 1995.

- Clarify the FSAR as to the licensing basis of the system.

- Update plant documents.

The fuel oil transfer system meets the Technical Specifications requirements for operable equipment and fuel oil supply and is enhanced by the completed corrective actions. Therefore, in view of the above listed corrective actions and the enclosed issue description, justification for continued operation and determination of no significant hazards; we have determined that operation of the diesel generator fuel oil supply system with the listed interim measures implemented will not present an undue risk to the public health and safety.

David W. Rogers

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Plant Safety and Licensing Director

CC Administrator, Region III, USNRC
NRC Resident Inspector - Palisades

Enclosure

ENCLOSURE 1

Consumers Power Company
Palisades Plant
Docket 50-255

JUSTIFICATION FOR CONTINUED OPERATION OF EMERGENCY DIESEL GENERATOR FUEL OIL SUPPLY

May 23, 1994

5 Pages

JUSTIFICATION FOR CONTINUED OPERATION OF EMERGENCY DIESEL GENERATOR FUEL OIL SUPPLY

INTRODUCTION:

The emergency diesel generator (EDG) fuel oil transfer system from fuel oil storage tank T-10 is not fully tornado or seiche protected and has not been maintained as safety related.

During a continuing review of documentation and the licensing bases for the EDG fuel oil supply system, it was determined on March 8, 1994, that the emergency diesel generator fuel oil transfer system, including the storage tank T-10 and associated piping, is not tornado protected. It was also established during the review that this condition does not meet the original General Design Criteria (GDC-2). A subsequent evaluation determined that the storage tank and associated piping has not been maintained as safety related and the diesel fuel oil transfer system is not fully protected from the effects of a design basis seiche.

A comprehensive evaluation of all the equipment in the fuel oil transfer system from storage tank T-10 to the EDG day tanks with respect to the applicable General Design Criteria (GDC) was performed in an effort to address not only the tornado issue, but also to identify all other potential fuel oil system issues related to the GDCs. The portion of the fuel oil transfer system from the EDG day tank to the diesel engine was not included in the evaluation because it has always been considered safety-related by the plant. A copy of the evaluation summary report is included in Attachment 1 to this enclosure.

This nonconforming condition was reported to the NRC by LER 94-007 dated April 7, 1994. Corrective actions for this event (which are identified in the LER) include interim measures to ensure the availability of a continuous fuel oil supply, procedures for alternate fuel oil transfer schemes, and additional physical protection. Corrective actions which have been completed include:

- Barriers around T-10 for routine protection from vehicles and a barrier at the T-926 connection to T-10 have been provided.
- A memo defining the safety related aspects of the T-10 tank and the diesel fuel oil transfer system has been provided to the Nuclear Engineering and Construction Organization (NECO) and the plant staff.
- Procedures and equipment to transfer oil from tank T-926 (additional on-site fuel oil storage) directly to the diesel generator day tanks have been provided and verified that the alternate transfer scheme is feasible and functional.

  Attachment 5 to System Operating Procedure (SOP) 22 provides alternative methods for refilling the EDG day tanks when the normal transfer system is not available. It is intended that this attachment be used only during emergency conditions. The Shift

Supervisor will specify the particular section of the procedure to be employed based on the availability of the fuel oil transfer system components. Some of the alternative methods depend on temporary hoses and an air powered diaphragm pump. To ensure a reliable compressed air supply for the air pump, the procedure provides for redundancy in the sources of compressed air. The sources are the Feedwater Purity (FWP) air compressor, the plant service air, or the air starting compressors of the in-service EDG. Each air start compressor is capable of supplying the air requirements of the air powered oil pump to transfer the maximum oil consumption rate of the EDGs. The air start compressors are supplied power from Class 1E sources which ensure availability of the compressors. In addition, gasoline engines provide backup to the electric motors for the air start compressors. The gasoline engines are inspected and started periodically (4 month intervals) to ensure their availability.

The air operated oil pump, hoses, and necessary tools are appropriately staged in the plant for accessibility when needed. Attachment 5 to SOP 22 has been performed and the equipment tested to ensure the alternative methods are viable. Water was used as the test medium to prevent unnecessary contamination of the air pump and hoses with diesel fuel oil. Palisades Engineering Analysis EA-E-PAL-94-010-01, "The Alternate Diesel Generator Air Driven Diaphragm Pump Flow," contains justification for the substitution of water for fuel oil during testing and verifies that the air driven pump can provide at least twice the fuel consumption rate of the EDG at full load.

Other longer term corrective actions include:

- Protect the fuel oil transfer pumps, P-18A and B, from potential flooding due to a design basis seiche. This is expected to be completed by June 30, 1994.
- Evaluate the system to determine the modifications required to upgrade it to a fully qualified 7-day fuel oil supply. The results of the evaluation will be provided to the NRC.
- Clarify the FSAR as to the licensing basis of the system by the next FSAR update.
- Update plant documents.

SYSTEM DESCRIPTION:

There are two emergency diesel generators at Palisades to provide a dependable onsite power source capable of starting and supplying the essential loads to safely shut down the plant and maintain it safely shut down in all plant conditions. Each diesel generator is supplied fuel oil by its diesel belly tank, an adjacent day tank and a common transfer system. The transfer system consists of a partially buried fuel oil storage tank, T-10; a single supply line between T-10 and two fuel oil transfer pumps, P-18A and P-18B; and a single supply line between the transfer pumps and the two EDG day tanks.

There is also an above ground concrete encased diesel fuel oil storage tank, T-926, which is equivalent in size to T-10, however, there is not a supply line from T-926 that permits the direct transfer of oil to pumps P-18A and B or to the EDG day tanks. No credit has been taken in the licensing basis for T-926.

Evaluation of the emergency diesel generator fuel oil supply system has determined it is operable although it does not meet all the aspects of the licensing basis documents, particularly those related to tornado missiles and seiche protection.

JUSTIFICATION FOR CONTINUED OPERATION

The plant is currently in cold shutdown. Startup and continued operation with the above defined nonconforming conditions is justified for the following reasons:

1) Technical Specifications (TS) Limiting Conditions for Operation (LCO) 3.7.1 requires that the primary coolant system shall not be heated or maintained at temperatures above 325°F unless both diesel generators are operable with a minimum of 2500 gallons of fuel in each day tank and a minimum of 16000 gallons of fuel in the underground storage tank. The "underground storage tank" is tank T-10 which is approximately 70% buried and has a covering of soil over the remainder. Surveillance requirement No. 8 in Table 4.2.2 in the Palisades Plant Technical Specifications requires the fuel inventory be verified daily. The levels in the EDG day tanks and storage tank T-10 are checked daily and verified to meet the TS inventory requirements.

   The TS requirement for 16000 gallons to be stored in the underground storage tank was based on the need to provide sufficient fuel on site for the operation of one diesel for seven days. A later Palisades Engineering Analysis, EA-A-NL-92-337-01, determined the current EDG fuel requirement for 7 days is 26200 gallons. This requirement is met by 2500 gallons in each day tank and 24000 gallons in T-10 (underground storage tank). Daily operating surveillance procedure D/WO-1 verifies that the quantity of fuel oil in each day tank meets the current TS requirements of 2500 gallons and the quantity of fuel oil in T-10 meets the current administratively controlled (Standing Order No. 54) inventory requirements of 24000 gallons. Therefore, the existing fuel oil system meets the Technical Specifications conditions for operation.

2) As stated in the FSAR, each diesel has a day tank and belly tank which provide a reliable fuel oil capacity for a minimum of 11.2 hours, based on a conservative bounding fuel oil consumption rate and load profile. This portion of the system has always been considered safety-related and meets the applicable GDC requirements. The diesel day tanks, which are normally refilled from T-10, are also capable of being filled from an alternate onsite fuel oil supply (T-926) by using manually connected hoses and an

air operated oil pump (SOP 22, attachment 5). The 11.2 hours exceeds the time necessary to implement attachment 5 to SOP 22, and thus, transfer fuel oil via the alternate transfer method.

3) To provide assurance that the past treatment of portions of the diesel fuel oil storage and transfer system as non-safety related has not affected the reliability of the system, an evaluation (E-PAL-94-010) of the system material condition was conducted on the active and passive system components. The evaluation considered the available data related to maintenance, testing, and operation that could provide information regarding the condition and reliability of the components. A summary report of that evaluation dated April 5, 1994, was prepared and recorded as Palisades Event Report E-PAL-94-010. That report is included in this enclosure as attachment 1. The report describes the evaluation process, provides an overview of the EDG fuel supply system, and presents its conclusions. The conclusion of the evaluation is that the diesel fuel oil storage and transfer system is reliable and functional. Even though it has been treated as non-safety related, sufficient surveillance, maintenance and operations activities have occurred to provide this assurance.

4) Evaluation (E-PAL-94-010) of the current system's capability in a design basis accident concluded the system is sufficient to ensure safe shutdown provided the short term corrective actions identified in LER 94-007 are implemented.

5) The operability of the fuel oil storage and transfer system was also assessed in E-PAL-94-010 for the following highly unlikely events:

TORNADO - Tank T-10 and some of the piping are not fully tornado missile protected, however, the rest of the system is judged to meet the requirements for tornado protection. Should tank T-10 or the unqualified piping be damaged or disabled during a tornado, tank T-926 can be an alternate fuel oil source. Based on engineering judgement, tank T-926, which is encased in a substantial concrete structure, will remain operable during and after a design basis tornado. A manually connected transfer hose and air operated pump can be used to transfer fuel oil from T-926 to the diesel day tanks (SOP 22, Attachment 5). Corrective actions for E-PAL-94-010C to provide procedures and equipment to transfer oil from T-926 directly to the diesel generator day tanks have been completed and verified capable of providing adequate fuel oil supply to the EDG day tanks. The level of fuel oil in T-926 is verified during the operator's daily rounds to be at least 20 percent of tank capacity which corresponds to approximately 7200 gallons. Seventy-two hundred gallons is adequate fuel oil to supply a diesel generator for 40 hours of operation at a conservative fuel consumption rate of 3 gpm. The typical reorder criteria is 40 - 50 percent of T-926 capacity (14100 gallons - 17700 gallons). It is also expected that the partially buried tank, T-10, even if damaged by a tornado missile, will still contain a quantity of useable fuel oil that can be transferred, if necessary, using an air powered oil pump.

NRC's final report for the Systematic Evaluation Program (SEP) Topic VII-3 dated 12/31/81, stated that the non-safety related transfer and storage system design was acceptable, in part, because the [then] "... 27.6 hour day tank capacity provides adequate time to rig the alternate pump to a Class 1E source or to refuel the day tank from a fuel truck". FSAR Section 8.4.1 currently recognizes that each diesel has a minimum day tank and belly tank capacity of 11.2 hours (at rated output power) and the day tanks can be refilled by tank truck. The minimum inventories in the day tank (2500 gallons) and in T-926 (7200 gallons) conservatively provide greater than 50 hours of operation which exceeds the 27.6 hours previously recognized as adequate to refuel the day tanks from a tank truck. Fifty hours exceeds the time necessary to receive fuel oil from offsite sources.

SEICHE - The maximum flood level used as the licensing basis results from a seiche on Lake Michigan. The oscillation of the lake surface is expected to be of short duration and then quickly recede. The licensing basis assumes an historical maximum monthly mean lake level of 582.6 feet and a probable maximum surge level of 593.5 feet. The lake level is currently approximately three feet below the maximum monthly mean level and is not expected to vary appreciably in the near term. A seiche at the current lake level would likely not flood the fuel oil transfer pumps which are protected by a one foot tall dike, however, the fuel oil transfer pumps, at approximately 590.5 feet, are vulnerable to the design basis seiche. The corrective actions to adequately protect the pumps from the flooding effects of a design basis seiche are expected to be complete by June 30, 1994. Until the transfer pumps are protected, by a higher dike, from the flooding effects of a seiche, a manual transfer scheme using an air operated pump and hoses could be used to transfer from fuel oil storage tanks T-10 and T-926 to the EDG day tanks (SOP 22, Attachment 5).

The other components of the fuel oil system were judged in evaluation E-PAL-94-010 to meet the requirements for protection from flooding effects of a design basis seiche.

SEISMIC EVENT - The fuel oil transfer system has been evaluated (E-PAL-94-010) for its seismic adequacy. The above ground piping in the SWS intake structure was excluded from the IE Bulletin 79-14 program and will be reviewed further to determine its ability to sustain a seismic event; however, the initial evaluations in E-PAL-94-010 indicate the piping is adequate to meet the seismic qualifications. The other components of the fuel oil system and the additional fuel oil storage tank T-926 were determined to be seismically adequate. The summary report for E-PAL-94-010 documents the evaluation. However, should the non-qualified piping be damaged, a manual transfer scheme using an air pump and hose can be used to transfer from fuel oil storage tanks T-10 and T-926 to the EDG day tanks (SOP 22, Attachment 5).

DETERMINATION OF NO SIGNIFICANT HAZARDS:

1) Continued operation of the plant does not involve a significant increase in the probability of an accident previously evaluated in the safety analysis report because the fuel oil transfer system cannot cause or influence the probability of an accident.

2) With the compensatory measures in place, continued operation of the plant with the nonconforming fuel oil transfer system does not involve a significant increase in the consequences of an accident previously evaluated in the FSAR because the fuel oil transfer system will continue to supply fuel oil as assumed in the previous evaluations.

3) Continued operation of the plant with the nonconforming fuel oil transfer system does not create the possibility of a new or different kind of accident from any accident previously evaluated because the fuel oil transfer system or the failure of the fuel oil transfer system is not capable of initiating a new or different kind of accident from any accident previously evaluated.

4) With the compensatory measures in place, continued operation of the plant does not involve a significant reduction in a margin of safety because the fuel oil supply system will continue to supply fuel to the diesel generators in the same quantities and for the same duration of time as those assumed in the analyses which have determined the margin of safety.

CONCLUSION

The safety function of the diesel generators is to provide a dependable power source for required equipment to ensure a safe shutdown in case of a design basis accident. In view of the foregoing, the conclusion of this evaluation is that the fuel oil storage and transfer system is capable of supporting the safety function of the EDGs provided the compensatory measures and short term corrective actions described in LER 94-007 are in place.

ATTACHMENT 1
TO
ENCLOSURE 1

Consumers Power Company
Palisades Plant
Docket 50-255

SUMMARY REPORT

EVENT REPORT E-PAL-94-010

EDG FUEL SUPPLY SYSTEM STORAGE TANK TORNADO PROTECTION
OVERVIEW OF THE EDG FUEL SUPPLY SYSTEM

May 23, 1994